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Positron Annihilation Spectroscopy of mechanically induced microstructures in metals

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We describe positron annihilation studies of mechanically induced defects in metals using a 3 MeV positron beam. These studies are intended to provide an improved understanding of the microscopic processes controlling the mechanical properties. The mechanical behaviors of metals are controlled primarily by dislocation generation, dynamics, and interactions among themselves and with impurity centers. Combined positron lifetime and Doppler broadening of annihilation radiation measurements are used to understand the type and concentration of positron trapping centers in metals subjected to controlled mechanical deformations. Theoretical modeling is being developed to understand the experimental results at the atomic scale.

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